

CLAIMS

1. A liquid-development electrophotographic apparatus in which a toner image formed by developing a formed electrostatic latent image by use of a nonvolatile liquid developer is transferred from an image-bearing member onto a printing medium by a melt transfer process, comprising:

control means for controlling a viscoelasticity of a toner image on the image-bearing member by bonding toner particles of the toner image together by means of partially melting the toner particles, so as to cause the liquid toner to enter a softened condition having a carrier agent in inter-bonded-toner-particle spacing, the control means causing the bonded toner particles to be separated from the carrier agent without causing the toner particles to be melted to such an extent as to be liquefied; and

carrier-agent-removing means for removing the carrier agent from the viscoelasticity-controlled toner image, the carrier-agent-removing means having a surface in contact with the carrier agent caused to float by use of electric field force, and removing the carrier agent by moving the surface in a direction opposite a moving direction of the toner image.

2. A liquid-development electrophotographic apparatus according to claim 1, wherein the viscoelasticity of the toner image is controlled such that, when a dynamic viscoelasticity of the toner image is measured at a forced vibration frequency of 1 Hz and an amplitude stress of 10 Pa,

a storage modulus falls within a range of $1.0E5$ Pa to $1.0E8$ Pa, and a loss modulus falls within a range of $1.0E5$ Pa to $1.0E8$ Pa.

3. A liquid-development electrophotographic apparatus according to claim 1, further comprising heating means for heating the toner image formed on the image-bearing member,

wherein the viscoelasticity of the toner image is controlled in such a manner that the heating means heats the toner image to a temperature at which the toner image exhibits a target dynamic viscoelastic value, which is determined on the basis of a previously measured relationship between heating temperature and the dynamic viscoelasticity of toner particles contained in the liquid developer to be used.

4. A liquid-development electrophotographic apparatus according to claim 3, wherein, when the toner image is heated, a temperature of the image-bearing member is controlled to a temperature lower than a boiling point of the carrier agent.

5. A liquid-development electrophotographic apparatus according to claim 1, wherein the carrier-agent-removing means is provided on the image-bearing member at a position located immediately before a position of transfer onto the printing medium; bias voltage is applied to the carrier-agent-removing means to thereby move charged toner particles of the toner image present on the image-bearing body and softened by the viscoelasticity control means toward the image-bearing body, to thereby cause the carrier agent to

float on the charged toner particles; and the floating carrier agent is removed.

6. A liquid-development electrophotographic apparatus according to claim 5, wherein the carrier-agent-removing means removes the carrier agent in such a manner that, when the toner image is to be transferred onto the printing medium, a solid content of the toner image is 50% to 95%.

7. A liquid-development electrophotographic apparatus according to claim 1, wherein, in a transfer section where the toner image is transferred onto the printing medium, a pressure to be applied between the image-bearing member and a backup roller is set to 0.5 MPa to 4.0 MPa.

8. A liquid-development electrophotographic apparatus according to claim 1, further comprising a plurality of removing means for removing the carrier agent each time a toner image in each of a plurality of colors for color printing is transferred onto the image-bearing member,

wherein the removing means move in the same direction as a moving direction of the toner images on the image-bearing member.

9. A liquid-development electrophotographic apparatus according to claim 1, further comprising printing-medium-heating means for preheating the printing medium to a temperature equal to or higher than a temperature of the image-bearing member before transfer of the toner image onto the printing medium.

10. A liquid-development electrophotographic apparatus

according to claim 1, further comprising means for applying bias voltage in such a manner that electric field force acts on the toner image in such a direction as to cause the toner image to move toward the printing medium in the course of transfer of the toner image onto the printing medium.

11. A liquid-development electrophotographic apparatus according to claim 10, wherein the means for applying the bias voltage applies the bias voltage between the image-bearing member and a backup roller; and the resistance of the image-bearing member is set to $1.0E7 \Omega\text{cm}$ to $1.0E10 \Omega\text{cm}$.

12. A liquid-development electrophotographic apparatus according to claim 1, wherein a rubber material is used to form an outermost surface of the image-bearing member from which the toner image is transferred onto the printing medium.